Progressive scan CCD color camera
HV-F202SCL
Specifications

RoHS Compliant
Directive 2002/95/EC

1. General

The HV-F202SCL is an UXGA high precision 3CCD progressive scan color camera, which has single chip digital processing LSI, a C mount prism, three 1/1.8-inch 2,000,000 pixels square CCDs.

Our original digital image signal processing technology performs the high picture quality signal processing and the picture compensating functions, beyond the capability of the other conventional analog cameras.

More ever, high frame rate 30 FPS(s) can be transmitted by miniCameraLink interface, which is of digital camera standards for FA. The two connector arrangement is considered so that the collision of cable does not occur at the time of Meidum Configuration connection which enrich the pixel gradation expression.

2. Outstanding features

(1) High resolution and color fidelity

The 1/1.8-inch 2,000,000 pixels square lattice progressive scan CCD and the dichroic prism for RGB color achieve a high resolution of UXGA (1600(H) x 1200(V)) picture and good color reproduction.

(2) Small-sized camera

The new designed camera has small SDR connector for digital output. Therefore, the camera has the realization of small-sized shape of 55 (W) x 55 (H) x 89 (D) mm.

(3) mini CameraLink interface

CameraLink Version 1.13 support

It is based on the industrial camera interface standard of AIA（Automated Image Association）leadership. It is advantageous to the field, where high frame rate is needed without losing camera performance, since the transmission speed of pixel clock can be maintained by full screen output.

mini CameraLink

The SDR connector called mini CameraLink is adopted and two connectors are equipped in a small case. Additionally, when using with L type connection, it is arranged as cable collision does not occur.

Meidum Configuration connection support

IIt supports Meidum Configuration connection which enables the rich gradation expression of each color of 10 bit or 12 bit.

SYMBOL	DATE	DESCRIPTION	(DRAWN)	DESIGNED
-	Mar. 1,2011	(first edition)	H.Kosaka	H.Kosaka

MODEL HV-F202SCL	TOLERANCE	Prod. Code - Order No.	
DESIGNED DATE / APPROVED DATE	UNIT	TITLE HV-F202SCL Specifications	REV. 0
CHECKED DATE / STORED DATE	SCALE		
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(4) C mount lens adapter

The de facto industry standard C mount lens adapter allows choosing from a various type of lenses and optical systems.

(5) Digital processing for various picture quality enhancements

- Independent six colors masking is the Hitachi innovation for optimizing color balance. The saturation and the hue of 6 colors (Red, blue, green, cyan, magenta and yellow) are adjusted independently to deliver the best color in image capture, microscope and other applications.
- It is equipped with the in out gradation control function using LUT. Other than normal gamma 0.45 conversion, the function can set the conversion of in out gradation using look up table (LUT) as a user option.

(6) Auto shading correction (ASC)

Color shading due to the aberration of C mount lens is automatically compensated (reduced).

(7) Versatile CCD drive functions

・Video frame capture on demand using external trigger signal.
See detailed specifications item 8.
・Long integration mode.
・Auto electronic shutter (AES) mode for stabilized video level.

(8) Versatile imaging functions

・Four application files.
User settings provided for sharpness (detail), masking etc.
・Scene color temperature is detected in dynamic for automatic white balance adjustment.
By varying the detection area in a scene, the whole white balance can be controlled in only the area. Thus, even if a light source of a different color temperature enters the scene (e.g., situation often occurs in a retail showroom suddenly exposed to outdoor lighting when the entrance door opens), white balance is not severely disturbed.
・Auto exposure (ALC : auto level control)
It can respond the changes in extremely high light by the digital measurement and AGC (Automatic gain control), AES control using micro computer. In addition, AUTO EXPOSURE (ALC) setting level and the peak/average of the AUTO EXPOSURE(ALC) characteristics can be set through menu screen.
・Gain control
AGC(Automatic gain control) and manual gain control are available to select.
・Master black, R/B black, and R/B gain are variable.

3. Specifications

(1) Imaging device (sensor type)	1/1.8-inch progressive scan interline CCD (x 3 sensor)
- Indication lens category	1/1.8 inch
Effective pixels (Active area)	1600 (H) x 1200 (V) (x 3 sensor for RGB) : Resolution
Pixel size	4.4 μm square lattice
- scanning area (Pixel area)	7.04mm (H) x 5.28mm (V), Diagonal 8.80mm (1/1.8 inch)
- Readout type, Transfer type	progressive scan, Interline transfer
(2) scanning mode	full pixel sequential scan
(3) scanning frequency	Horizontal : 37.5kHz / Vertical : 29.95Hz / Pixel : 72.0MHz
(4) Optical system	1/1.8-inch F1.8 prism with IR cut filter Graph is described later.
(5) Lens mount	C mount Mount surface projection less than 4.0mm

(Lens selection guideline)

Use the lens less than 4.0mm as the projection item from the lens flange surface.

To obtain a good picture image by high resolution and few chromatic aberration, it is necessary to choose an appropriate high resolution 3CCD type lens.

When using lens other than 1/1.8 type, there may be vignetting or insufficiency of light around the image or occurrence of flare in the image, in this case combinational lens selection is necessary.

(6) Flange focal distance	17.526 mm (Air conversion)
(7) Sensitivity	2000 lx, F5.6, light source halogen lamp temp.: 3200K Shutter : 1/30s, Gain 0dB
(8) Minimum illumination	12 lx, Video Level 50%, Gamma = 0.45 F1.8, Shutter : 1/30s, Gain +12dB
(9) Gamma	0.45 / 1.0 / LUT (Look Up Table : user customizable)
(10) Gain	Manual : 0 to 12 dB / AGC : 0 to 12 dB (with limit setting)
(11) White balance	Manual / One-push Auto / Continuance Auto
(12) Video output	CaemraLink Version 1.13 standard Base configuration (only D.OUT 1) Medium configuration (using D.OUT 1 with D.OUT 2) Control : Original
(13) Video output format	Base configuration 24bit (R:8bit, G:8bit, B:8bit) Table is described later.
(14) Quantization level information	Maximum data : 255 (8bit), 1023 (10bit), 4095 (12bit) Video 100% white : 255 (8bit), 1023 (10bit), 4095 (12bit) Video 0% black : 0, Minimum data : 0

(15) Electric shutter speed	OFF / Auto (AES) / Manual (VARIABLE)
Variable shutter mode	Exposure time : approx. 1/100,000 to 1/30 second
AES mode	Exposure time : approx. 1/100,000 to 1/29.95(shutter OFF) second
Long time integration mode	Exposure time : approx. 1/30 to 10 seconds in 1 frame steps
(16) Sync system	Internal / VD external
(17) Frame on demand mode	
Input mode	(A) Fixed shutter mode : adjustable for polarity and delay (B) ONE trigger mode : adjustable for polarity and delay (C) VD reset mode : negative, frequency Approx. 29.95Hz
Trigger input	CameraLink (CC1) or DCIN/SYNC connector
Input level	5Vp-p ± 0.5V
Output	strobe signal VD output : negative, frequency Approx. 29.95Hz
Synchronous output	DCIN/SYNC connector
Output level	5Vp-p
(18) Registration	Full screen 0.05% (not including lens response)
(19) Vertical contour correction	2H
(20) Sharpness (DTL)	Level, WIDTH
(21) Color masking	OFF / ON (6 color independent masking)
(22) Paint black	Adjustable
(23) Black level	Adjustable
(24) Knee	Adjustable (Knee point and Knee slope)
(25) Power supply	DC+12V ± 1V (input from DC IN / SYNC connector)
(26) Current consumption	DC+12V Approx. 600mA (Approx. 7.2W)
(27) Ambient temperature	(without dew condensation)
Performance	0 to +40℃ (+32 to +104 F), less than 90 % RH
Operation	-10 to +40℃ (+14 to 104 F), less than 90 % RH
Storage	-20 to +60℃ (-4 to 140 F), less than 70 % RH
(28) External dimensions	55(W) x 55(H) x 89(D) mm (not including protrusions)
(29) Mass	Approx. 350g (without lens)

(30) Remote control

(a) Signal system

Control system	Start-stop synchronization system
Transmission rate	9600 bps
Data length	8 bits
Start bit	1bit
Stop bit	1bit
Parity	None
Bit transfer	LSB first

(b) Communications control system

Full control by remote control software, data send/receive by text data transfer to camera microprocessor (BSC system handshake)

(c) Control items

1. Variable shutter	10 to 1/100,000 second
2. Trigger Mode	Fixed shutter, One trigger, VD reset
3. Gain	
4. AUTO EXPOSURE	
5. White balance	
6. Gamma	
7. 6 vector independent masking	
8. Paint black	
9. Sharpness	
10. Brightness	
11. 24bit / 30bit / 36bit	Factory setting: 24bit
12. Trigger pulse polarity	Factory setting: POS
13. Trigger input	CameraLink (CC1) or DCIN/SYNC connector Factory setting: CC1
14. Output signal	OFF, FLASH OUT and VD OUT Factory setting: OFF
15. Application files	

4. Composition

(1) Camera
(2) Lens mount sheet
(3) DCIN/SYNC connector (HR10A-10P-12S)
(4) Installation guide

5. Optional accessories

(1) AC adaptor	JC-100 (junction box is included)
(2) Junction box	JU-F30
(3) Tripod adaptor	TA-F202
(4) 12pin plug	HR10A-10P-12S(01)

(5) Camera cable

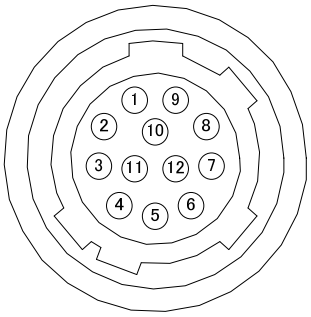
	Molded type	Shield type
2 m	C-201KSM	C-201KSS
5 m	C-501KSM	C-501KSS
10 m	C-102KSM	C-102KSS

In the CE Marking region, use the shield type and install clamp filter （ZCAT2035-0930A: TDK） at both ends of the cable.

6. Specification of Digital output connector

(1) DCIN connector

PIN NO.	Signal	PIN NO.	Signal
1	GND (+12V)	7	TRIG-A / VD (H) IN
2	+12V	8	TRIG-B (C) IN
3	GND	9	TRIG-B (H) IN
4	N.C.	10	FLASH / VD OUT
5	N.C.	11	N.C.
6	N.C.	12	TRIG-A / VD (C) IN



Connector (camera side) : SAMWOO SNH-10-12 (RPCB) or equivalent
Plug (matching cable plug) : Hirose HR10A-10P-12S (01) or equivalent

Please do not unplug and insert cable (camera cable) with a power supplied to a camera.
Install clamp filter (ZCAT 2035-0930A: TDK) at both ends (camera and video processor ends) in the CE marking region.

TRIG-A/VD and TRIG-B are photo coupler input, 8/12/5 pin isisolated with 1/3 pin.
When 8/12/5 pin is connected to GND, please connect to 3 pin.

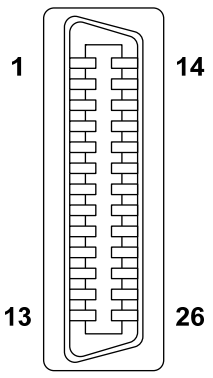
Note: Please do not input any signal to N.C. pin because machine may break down.

(2) DIGITAL OUT connector

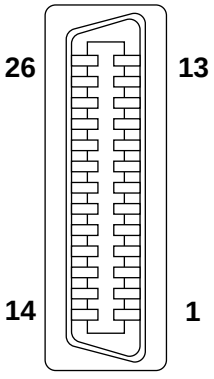
(a) Interrelation between number of DATA bits and number of used connector

	Number of Data bits	D.OUT1	D.OUT2
1	24bit (R: 8bit G: 8bit B: 8bit)	O	–
2	30bit (R: 10bit G: 10bit B: 10bit)	O	O
3	36bit (R: 12bit G: 12bit B: 12bit)	O	O

O: Use
–: Not use



D.OUT1



D.OUT2

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(b) Signal connection to DIGITAL OUT connector

Connector 1 (D.OUT1: 24bit / 30bit / 36bit)

Pin No.	Signal	Pin No.	Signal
1	GND	14	GND
2	TXOUT 0 (−)	15	TXOUT 0 (+)
3	TXOUT 1 (−)	16	TXOUT 1 (+)
4	TXOUT 2 (−)	17	TXOUT 2 (+)
5	TXCLKOUT (−)	18	TXCLKOUT (+)
6	TXOUT 3 (−)	19	TXOUT 3 (+)
7	RX (+) [SERTC (+)]	20	RX (−) [SERTC (−)]
8	TX (−) [SERTFG (−)]	21	TX (+) [SERTFG (+)]
9	TRIG/VD (−) [CC1 (−)]	22	TRIG/VD (+) [CC1 (+)]
10	N.U. [CC2 (+)]	23	N.U. [CC2 (−)]
11	N.U. [CC3 (−)]	24	N.U. [CC3 (+)]
12	N.U. [CC4 (+)]	25	N.U. [CC4 (−)]
13	GND	26	GND

Connector 2 (D.OUT2: 30bit / 36bit)

Pin No.	Signal	Pin No.	Signal
1	GND	14	GND
2	TYOUT 0 (−)	15	TYOUT 0 (+)
3	TYOUT 1 (−)	16	TYOUT 1 (+)
4	TYOUT 2 (−)	17	TYOUT 2 (+)
5	TYCLKOUT (−)	18	TYCLKOUT (+)
6	TYOUT 3 (−)	19	TYOUT 3 (+)
7	N.U.	20	N.U.
8	N.U.	21	N.U.
9	N.U.	22	N.U.
10	N.U.	23	N.U.
11	N.U.	24	N.U.
12	N.U.	25	N.U.
13	GND	26	GND

Connector (camera side) Sumitomo 3M 1226-1100-00PL or equivalent

N.U.: Not used

- D.OUT2 is used for Medium configuration.
- The digital out cable should be comprised of a twisted pair of wires having 100 ohm characteristic impedance and an outer sheath shield type conductor.
- Connect the shield (ground) of the digital out cable to the ground terminal of the video equipment, frame grabber, etc.
- Install clamp filter (ZCAT2035-0930A: TDK) at both ends (camera and video processor ends) in the CE marking region.
- TX: Transmit data from camera to PC
- RX: Transmit data from PC to camera

(Note) Please do not unplug and insert cable (digital out cable) with a power supplied to a camera.

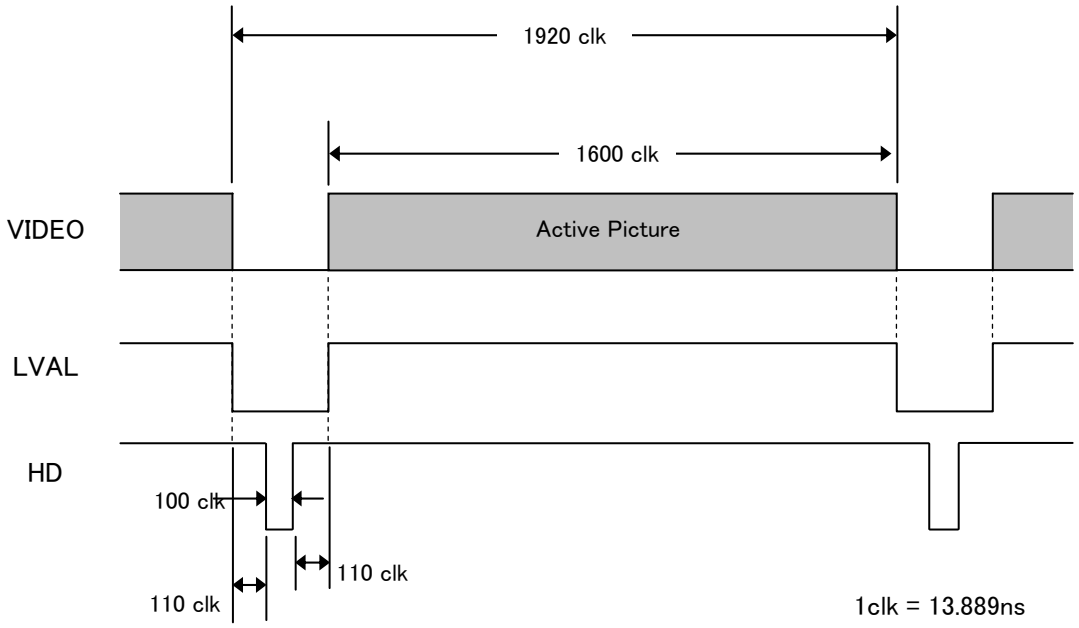
7.Video output format (Typical example)

Data length	Horizontal Pixels	Vertical Pixels	FRAME RATE	support standard
R:8bit, G:8bit, B:8bit	1600	1200	Approximately 29.95FPS	Base configuration (using D.OUT1 only)
R:10bit, G:10bit, B:10bit	1600	1200	Approximately 29.95FPS	Medium configuration
R:12bit, G:12bit, B:12bit	1600	1200	Approximately 29.95FPS	Medium configuration

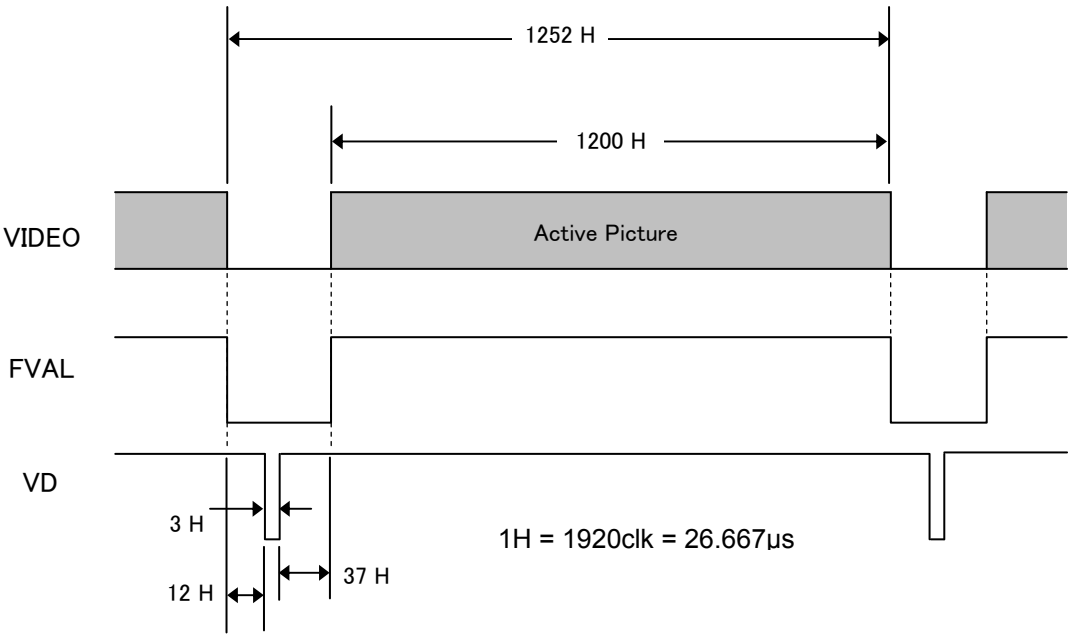
8. Timing chart

8-1. Transmitter LVDS output

(1) DATA TIMING (H)



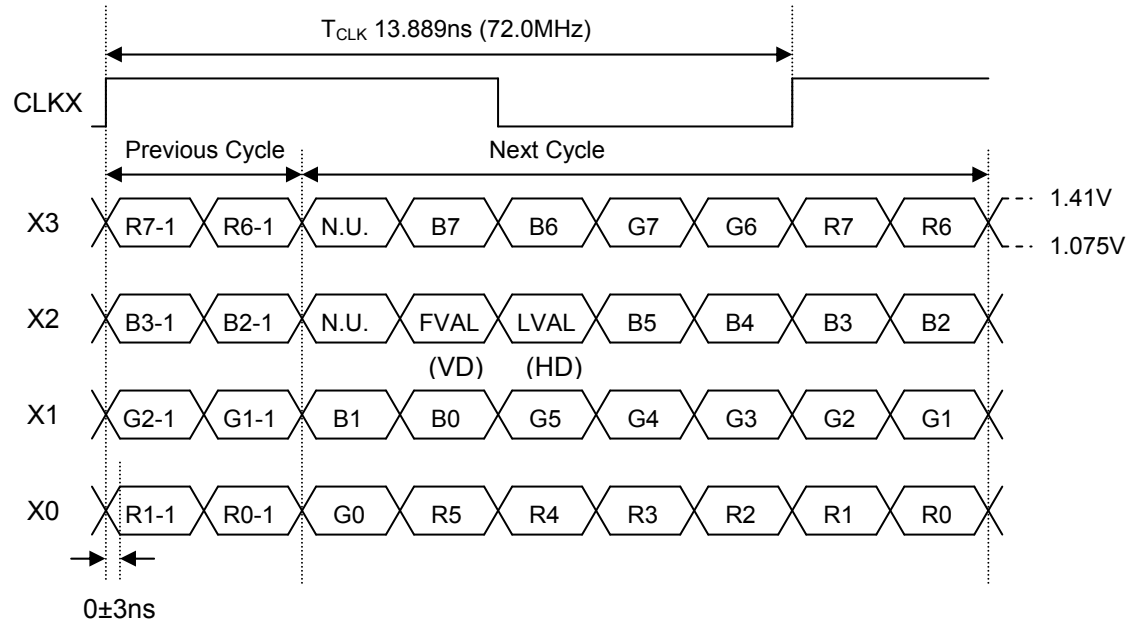
(2) DATA TIMING (V)



(3) LVDS SERIAL DATA

(a) Base configuration 24bit

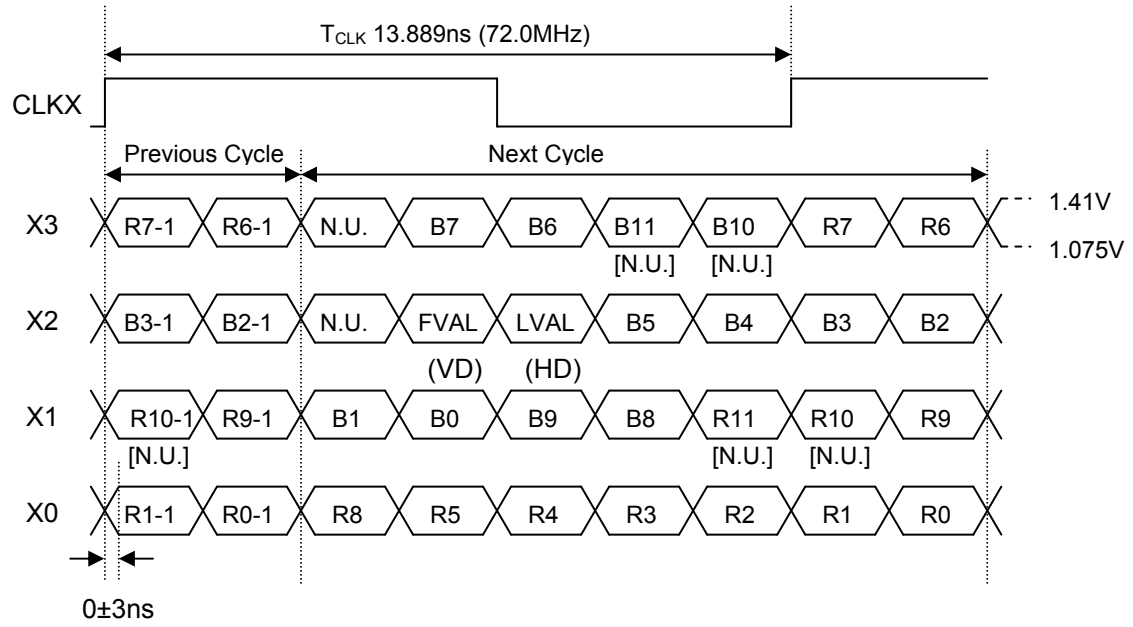
D.OUT 1



N.U.: Not used

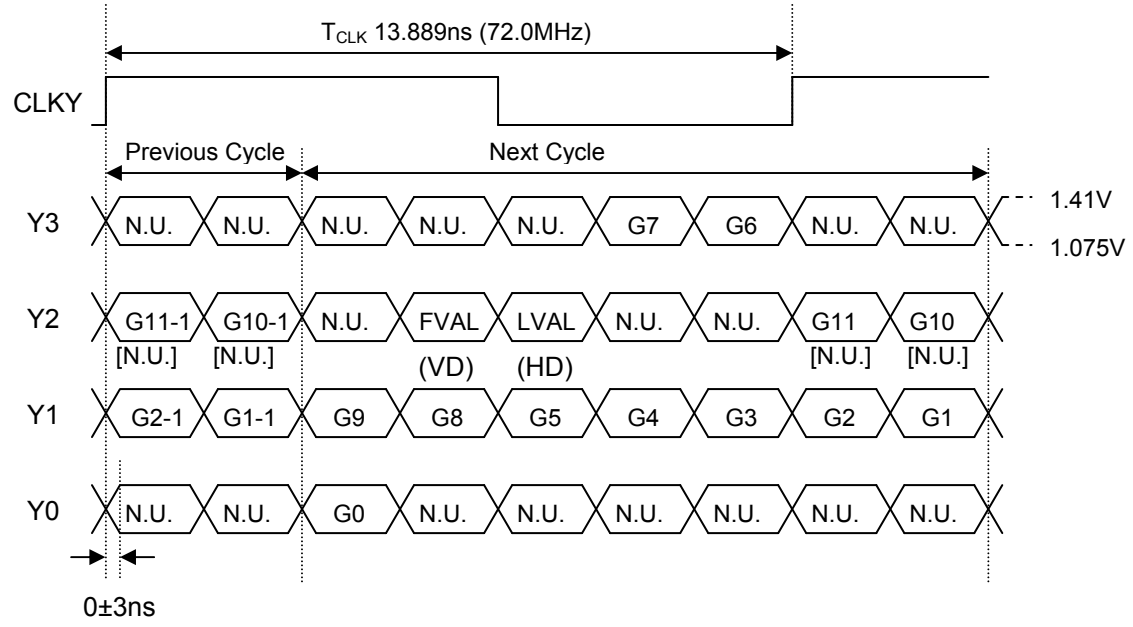
(b) Medium configuration 36bit / [30bit]

D.OUT 1



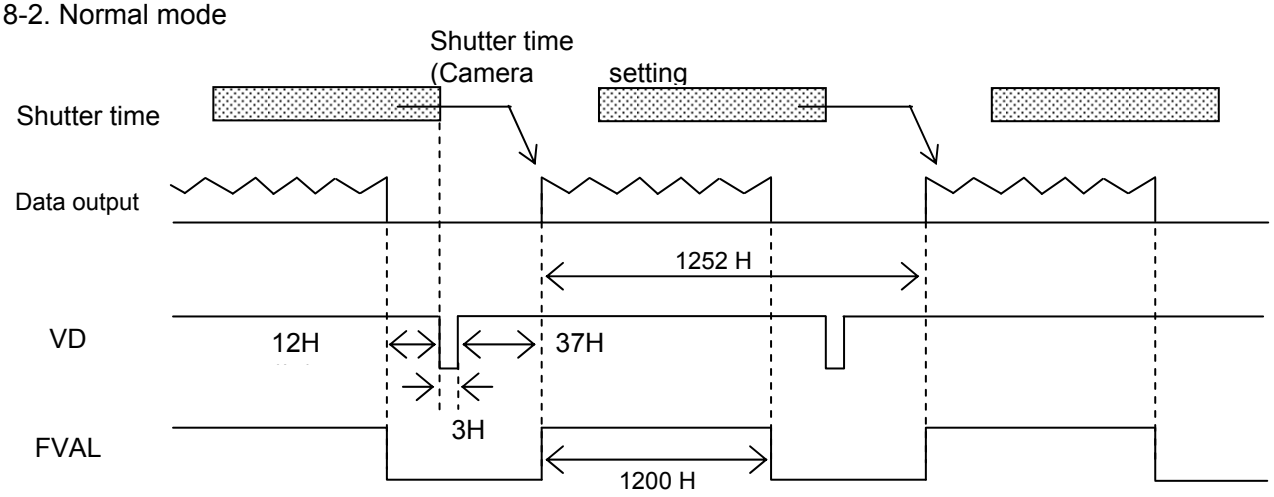
N.U.: Not used

D.OUT 2



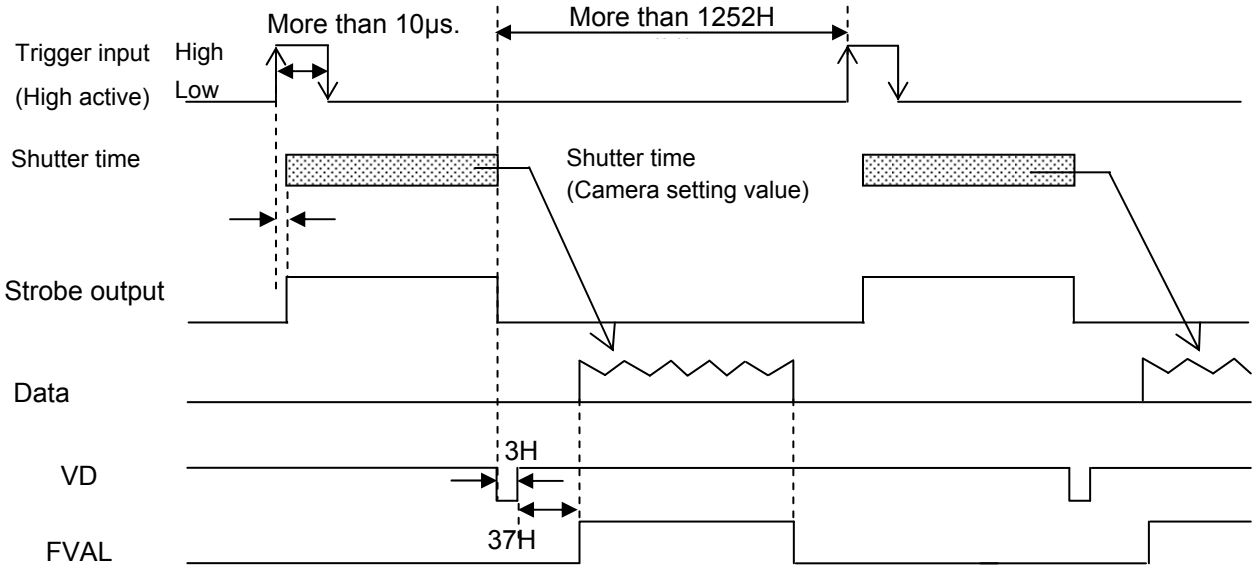
N.U.: Not used

8-2. Normal mode



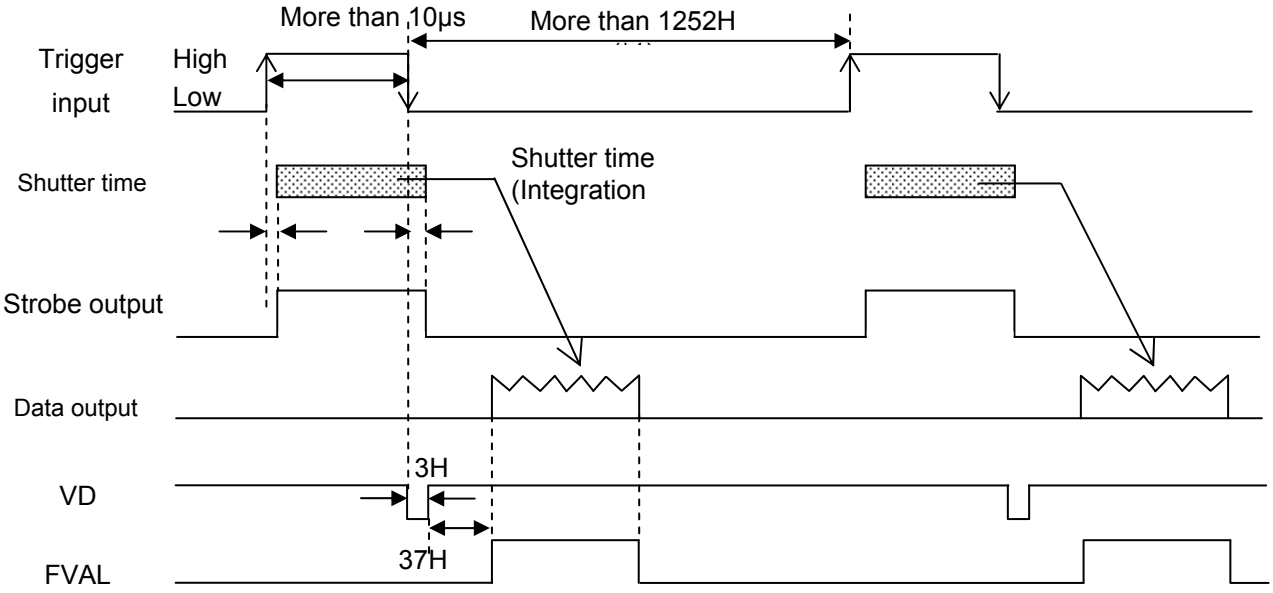
8-3. Fixed shutter mode

When external trigger signal is POSITIVE (high active), after the trigger signal rise, exposure is start. The exposure time is set by the camera electronic shutter speed. The video output is obtained immediately after the end of fixed exposure. The strobe signal start/end can be set to shutter time. Trigger signal input during exposure is disabled.

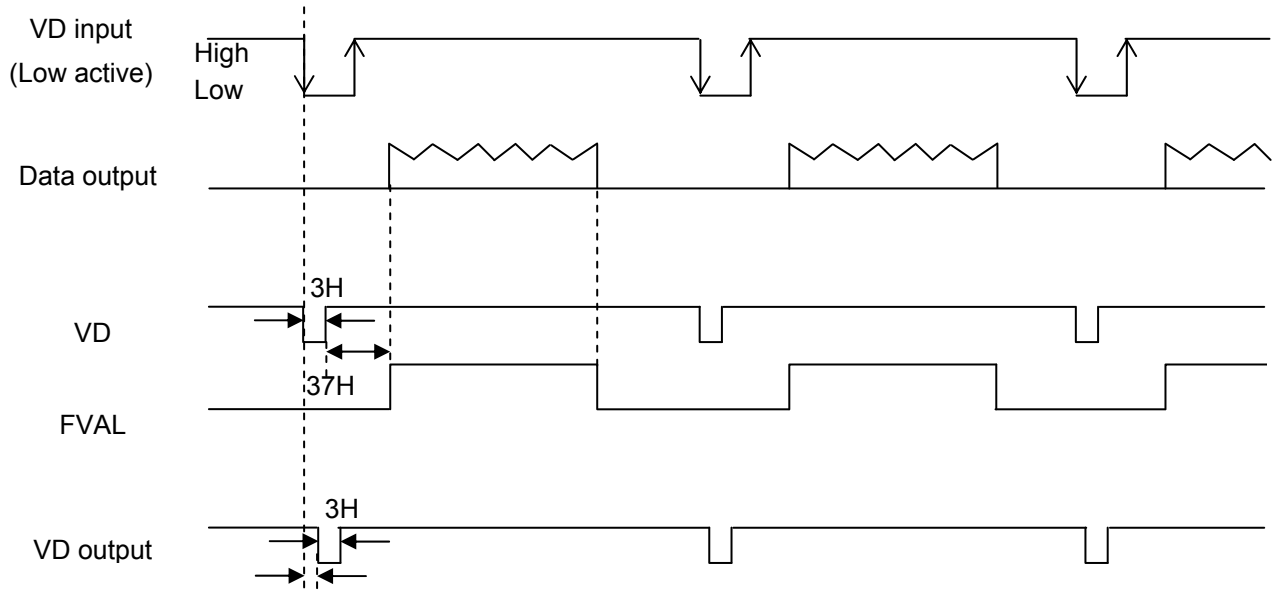


8-4. ONE Trigger mode

When external trigger signal is POSITIVE (high active), after the trigger signal rise, exposure is start. At the trigger signal falling edge, the internal VD signal is reset and the video data are transmitted. The trigger signal width equals the exposure time.

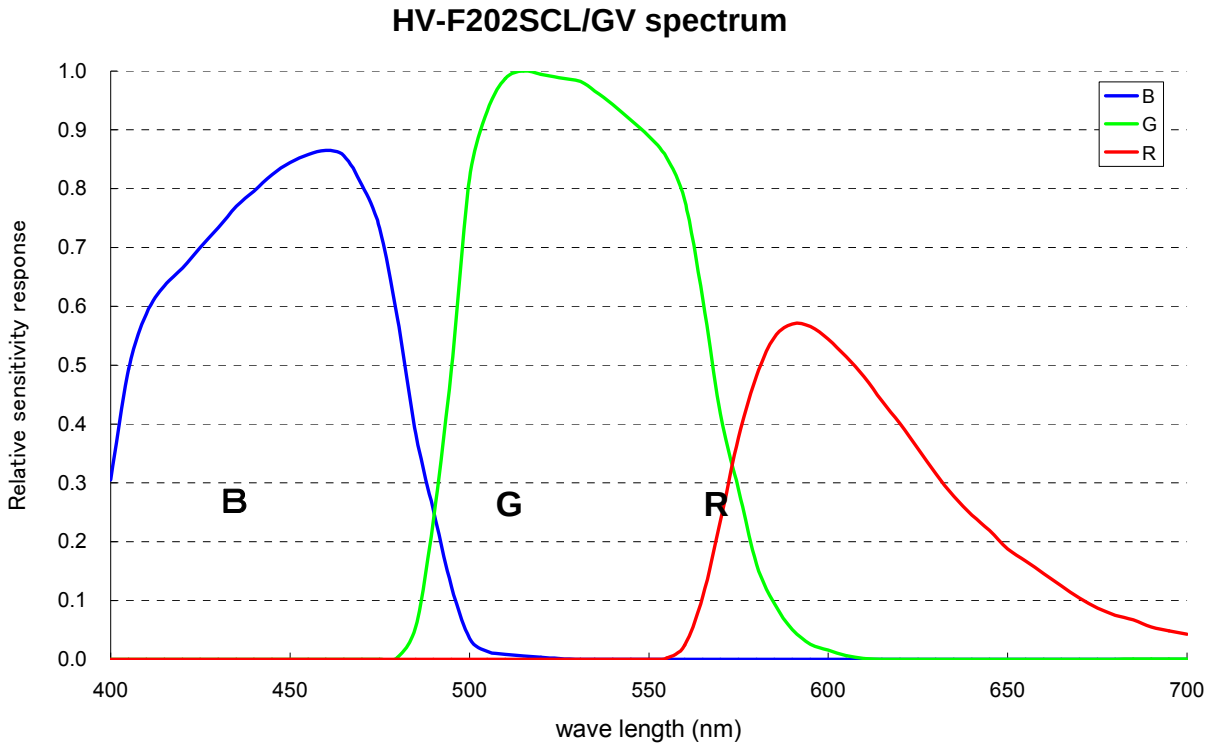


8-5. VD reset mode



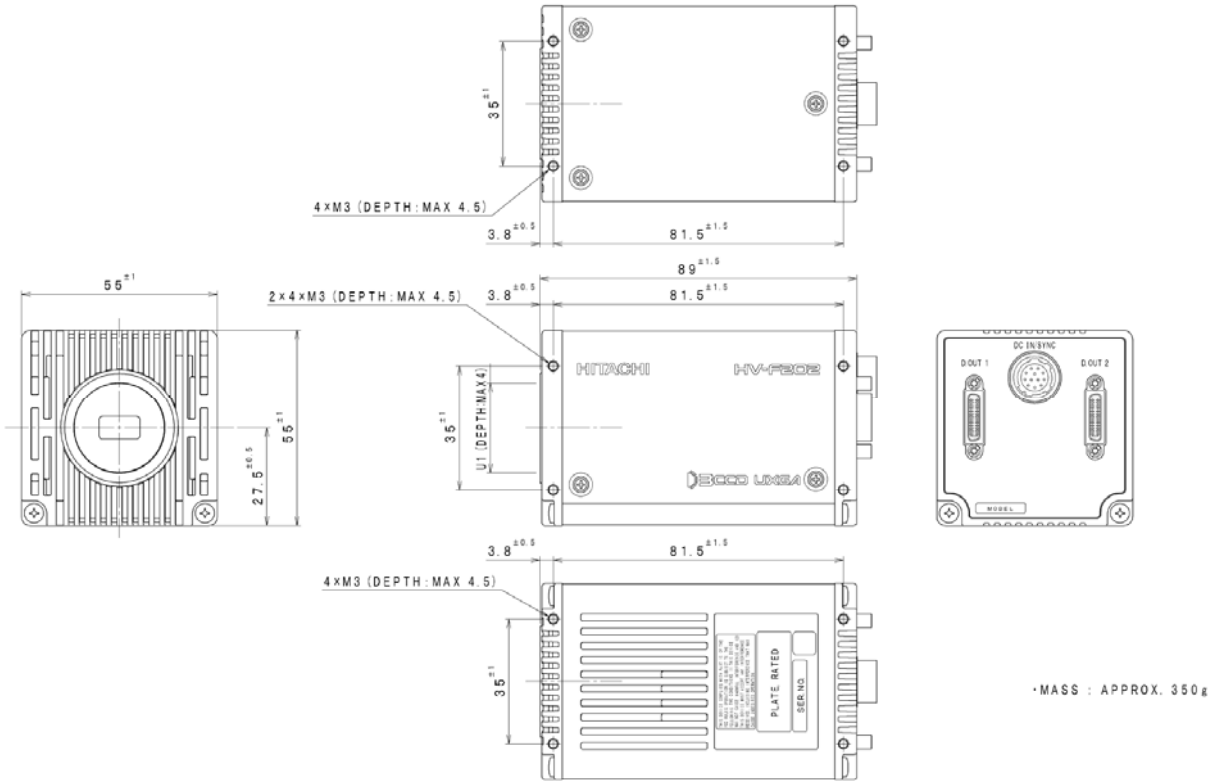
NOTE: If the external VD of cycle which does not match the camera operation mode is input, shutter time has an error.

9. Spectral sensitivity characteristics



Example by the integrated value of the representative sample data of the optical component and the image sensor in the camera.

10. External view



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Notice:
These specifications are subject to change without prior notice due to product improvement. Confirm the most recent specifications at time of order.
Hitachi Kokusai Electric certifies this product complies with the standard warranty conditions of Hitachi Kokusai Electric, and that quality control is implemented to the extent required to comply with these conditions.

Warranty and service:

1) The guarantee period is two year after the data purchase. However, the defects due to erroneous use or intentional act are excluded.
2) As the defect after expiration of the guarantee period, where product repair is possible, repair will be performed at charge.
3) The present Warranty pertains only to the camera unit. Secondary malfunctions attributable to camera failure as well as expenses incurred by disassembly and reassembly of the related system, are beyond the scope of this Warranty.
4) Compensation for loss of business, loss or damage to software, database and other contingent losses are beyond the scope of this Warranty.
5) Hitachi Kokusai Electric Inc. is not liable for the losses caused when the equipment is used in a system, use for business trades, production process, medical fields, crime prevention applications, etc.
6) The parts used in the equipment have their respective lives. The lives of such parts will be shortened under the environments of high temperature or high humidity. When the stable operation is required for a long time, it is recommended to perform periodical maintenance and inspection every year or every two years.

Modification history

SIMBLE	DATE	CORRECTION AND REASONS		DESIGNED